

Mitigation Measures: Ambient Pollution Removal Techniques

September 2019 | Version 1.0

The IAQM issues Position Statements on matters that could affect the way in which Members carry out their professional tasks and on air quality topics and issues where the IAQM can provide a unique perspective from which to give a professional opinion.

The issue



The reduction in pollutant concentrations by a reactive surface, a filtration medium or vegetation can at first appear to be attractive, as these methods may be more easily implemented than other measures, such as emission reduction or exposure removal. The issue is whether these techniques are actually effective, worthwhile implementing, cost effective and whether changes can be quantified in terms of concentration reduction.

Background

Helpfully, the available evidence on this topic has been carefully examined by Defra's Air Quality Expert Group (AQEG). On paints and surfaces for the removal of nitrogen oxides, AQEG conclude that: "Photocatalytic surfaces can reduce concentrations close to the treated surface but this will not result in significant reductions in NO₂ concentrations in the surrounding air. It is not physically possible for large enough volumes of air to interact with the surface under normal atmospheric conditions and therefore this method will not remove sufficient molecules of NO₂ to have a significant impact on ambient concentrations."¹

On green infrastructure, AQEG acknowledges the important roles of vegetation in affecting air movement and potentially separating people from pollution sources; but on the subject of pollutant removal notes that: "the planting of trees may enhance or reduce dispersion; this redistributes pollution but does not remove it" and "for practical planting schemes and PM from all sources, the scale of reductions is expected to be no more than a few percent. For NO₂, vegetation is not a very efficient sink and, as the deposition occurs in daytime, and primarily in the warmer months, there is little benefit for air quality for most of the time that NO₂ is a problem."² Furthermore, green infrastructure can increase pollutant concentrations through the emission of VOCs which "can contribute to the formation of further pollutants, such as PM and ozone".

Measures claiming to remove pollutants from ambient air have limited effectiveness. The effectiveness of any material at removing pollutants is limited by the volume of ambient air passing over its surface. In practical terms, it is extremely difficult for enough polluted air to come into contact with the material's surface to measurably reduce pollutant concentrations. For vegetation, the available evidence suggests that, while the rough surface is able to slightly enhance the deposition of particles, the uptake of NO and NO₂ is extremely limited, because these gases are not rapidly deposited.

IAQM's position on the issue

The reduction of emissions at source or the reduction in exposure to pollution is always preferable to the use of any technique that purports to remove pollutants from the air by active or passive means. Before an investment is made in any solution of this kind, a thorough appraisal of the efficacy of that solution should be carried out based on scientific evidence and professional judgement.

References

¹ https://uk-air.defra.gov.uk/assets/documents/reports/cat11/1604130958_PB14425_Paints_and_Surfaces_for_the_Removal_of_Nitrogen_Oxides.pdf

² https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1807251306_180509_Effects_of_vegetation_on_urban_air_pollution_v12_final.pdf

About the Institute of Air Quality Management (IAQM)

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